

TECHNOLOGIES FOR PEOPLE WITH SPECIAL ACCESS NEEDS

Web designers, librarians, and other information providers must be aware of how people with disabilities interface with the computer to access electronic information and become familiar with products which could and should be acquired for in-library usage.

Engineers at Sun Microsystems state that the traditional view of people “having a disability” or “not having a disability” is overly simplistic. As more people reach their 40s or 50s, they will be looking at computer screens with bifocals and may have trouble viewing traditional displays. Likewise this same group of users may start experiencing a slight hearing loss and not notice software alert sounds if there are distractions. This group may not admit to having a disability, but will readily seat themselves in front of the library’s large monitor.

Note that although broad definitions affect the various disabilities, each person will be seeking an access solution that best satisfies his or her needs. For example, assistive computer solutions that work for patron Edelman, a senior citizen who is blind, may not work for patron Grant, a senior citizen who is visually impaired and hard-of-hearing. Assistive computer solutions that help Ms. Rollins, a student with a learning impairment, may be of no use to Ms. Smithee, another student with a learning impairment.

Acknowledging this diversity, it seems a daunting task for libraries to provide a workstation and develop an accessible Web site that all people will be able to use. With planning, a modest budget, and a willing staff, libraries can design workstations to serve most patrons. There may still be some people with severe disabilities whose needs are highly specialized and will need to be considered on a case-by-case basis.

A reasonable alternative for those people whose access solution is specialized is to allow the person to install his or her adaptive device on the library’s computer. This alternative would take planning and coordination with the library’s automation department. Also, if the library’s Web site is designed properly, the people unable to use computer equipment at the library should be able to use the library from home or work, using their own equipment. Libraries can develop procedures for delivering documents that cannot be retrieved off-site.

Access for people who are blind or have a learning disability

Print provides a barrier to information access for people who are blind or who have certain types of learning disabilities, so these people must retrieve information another way. Although the two disabilities are different, they are similar in that both groups of people cannot assimilate the printed word. With the right tools, a blind person or one with a learning disability can navigate the Internet effectively.

How people who are blind may interact with a computer and assistive technology

For the purpose of interfacing with a computer, a person who is blind can be considered as someone who cannot use a visual display. People who are blind usually have little or no trouble inputting information, as most can use the keyboard effectively. Accommodation is not needed at the input end of the information chain but is needed for information retrieval. A person who is blind will more than likely not turn on the monitor when accessing information. A blind person will not be able to perform tasks that require eye-hand coordination, such as manipulating a mouse. A person who is blind and wishes to access computer information more than likely will use a Braille display or synthesized speech output.

How people who have a learning disability may interact with a computer and assistive technology

Those with learning disabilities may have trouble inputting information, as well as retrieving information. Although some may have trouble with eye-hand coordination, most will not. They may have difficulty, however, inputting words correctly or with speed. Additionally, some people with learning disabilities need to see and hear the words as they are read. Alternatives may be speech recognition input, synthesized speech output, and a print display.

Specific technologies

Screen readers

A screen reader is a software program that works with a speech synthesizer to provide users with a verbal accounting of everything on the screen that is labeled, including control buttons, menus, text, and punctuation.

When working in a Windows environment, screen readers must do more than simply lift material from the screen and send it to the synthesizer. Jay Levanthal and Crista Earl of American Foundation for the Blind, in the article "Screen Readers and Speech Interfaces on the Internet," (given at CCUN 2001) divide the tasks of a screen reader into five categories:

1. Identify and read text and graphics.
2. Identify and announce the function of Windows constructs.
3. Identify graphics.
4. Serve as a mouse or pointing device.
5. Provide the information efficiently, in an order and with terminology meaningful to the user.

Screen readers effectively read and narrate the text that people able to see would normally read. Although the technology is sophisticated, it must follow certain design rules, so good Web design is imperative. This design should recognize that some users are accessing the Web with screen readers.

Selecting a screen reader

The first consideration when selecting a screen reader is browser compatibility. Screen readers work efficiently with the Web browsers

Article is at: www.csun.edu/cod/conf2001/proceedings/0110leventhal.html.

Microsoft Internet Explorer and Netscape Navigator, and IBM Home Page Reader; however, all versions of the software do not work with all versions of the browsers. The software vendor should be able to provide a compatibility list.

When selecting a screen reader, determine which screen reader is most popular among blind computer users in the library's service area. Selecting a popular browser reduces the learning curve for those with a product familiarity. Selecting a popular browser also gives the library a patron base to which the library may turn when seeking volunteer tutors for novices. Seasoned screen-reading users may also develop tutoring manuals and quick tip sheets based on their experiences. Consumer-crafted instructions are less intimidating than vendor-produced ones.

Being aware of the screen-reading software used in the area helps the library's Web site designers create navigational guides and become aware of how the library's Web site sounds to those using the software.

Help in selecting a screen reader

The Technology-Related Assistance for Individuals with Disabilities Act (P.L. 100-407 or Tech Act) was signed into law by President Ronald Reagan on August 19, 1998, and reauthorized in 1994 and 1998 by President Clinton (as Assistive Technology Act, P.L. 103-218 and P.L.105-394). The act provides funding to develop statewide consumer-responsive information and training programs designed to meet the assistive technology need of individuals with disabilities.

Should the library be unaware of the popular screen readers (or any other type of assistive technology) in the service area, local consumer groups or the state's Tech Act Project office can be contacted.

The Alliance for Technology Access Resource Center may also be of assistance. It is a growing organization, so the sophistication of chapters vary from state to state.

Entities such as libraries, which are liable for adhering to the mandates of the ADA, are entitled to the services of the Disability and Business Technical and Assistance Centers, a division of the National Institute on Disability and Rehabilitation Research (an Agency of the U.S. Department of Education). The 10 regional offices are each unique in scope. All, however, provide technical assistance; education, training, and information; and referral services on issues concerning access under the ADA.

Involving consumers can also offer the library the valuable asset of someone having "been there and done that."

Purchasing screen-reading software

Some screen-reading products are playing catch up to the ever-changing Web. Have the products demonstrated with the system being used by the library. Levanthal and Earl present a checklist to use when purchasing a screen reader. They state that screen readers must:

- Present Web pages in a logical order instead of as they would normally appear if no screen reader were loaded. This mode may include commands to: jump to the next link, skip a series of links, read to the end of the page, and navigate using the arrow keys, rather than a mouse.
- Have the ability to support other accessibility features.
- Have the ability to present a list of links in alphabetical or page order.

Two of the larger patron groups are the American Federation of the Blind and the American Council of the Blind. To locate a chapter in the library's service area, see www.nfb.org or www.acb.org.

To link to local Tech Act Center chapters, see www.resna.org/taproject/at/statecontacts.html or call the RESNA Technical Assistance Project at 703-524-6686.

To locate an Alliance for Technology Access Resource Center, see www.ataccess.org or call Alliance for Technology Access at 800-455-7970.

To locate the National Institute on Disability and Rehabilitation Research in the library's service, call 800-949-4232.

In-depth reviews may be found in issues of the *Journal of Visual Impairment & Blindness*. Information on HAL may be found in the article "Screen Access to Windows and the Internet with HAL and Supernova" at www.csun.edu/cod/conf2001/proceedings/0230pors.html.

ALVA Access Group:
www.aagi.com/aagi/aagi_home.html

Artic Technologies:
www.artictech.com

Dolphin Computer Access Group:
www.dolphinuk.co.uk

Freedom Scientific:
www.freedomscientific.com

GW Micro, Inc:
www.gwmicro.com

IBM Corp., Special Needs Division: www.ibm.com
Synthavoice:
www.synthavoice.com

- Have a method for reading tables in a logical, efficient manner.
- Have the ability to find text anywhere on the page.
- Have the ability to find any control on the page.
- Have a find feature that does not disturb the screen.
- Have a generic way to read status lines in applications.
- Have the ability to read sentences and paragraphs.
- Have the ability to reclass problem controls.
- Have the ability to read system messages after an illegal operation.
- Have flexibility in the order in which items are spoken.
- Have a pixel-by-pixel drag-and-drop capability.

An important point to remember, however, is that when the user accesses the Internet and the World Wide Web, the output from the screen reader will only be as good as the design of the page. Poorly designed Web sites will still be inaccessible to the users who cannot access print.

Popular screen readers

A variety of screen readers are available in North America, including:

- JAWS for Windows, a product of Freedom Scientific
- OutSpoken for Windows, a product of Alva Access Group
- Window Bridge, a product of Syntha-Voice computers, Inc.
- Window-Eyes, a product of GW Micro, Inc.
- WinVision, a product of Artic Technologies International
- HAL, a product of Dolphin Computer Access

A cursory overview of most of these products (Screen Readers and Interfaces on the Internet) may be found at www.csun.edu/cod/conf2001/proceedings/0110leventhal.html.

Most vendors of screen readers provide trial versions of the software. Libraries should try out the desired products before buying to ensure compatibility with hardware and software systems.

A note about speech synthesizers

A speech synthesizer is essentially the mouthpiece for the screen-reading software. A speech synthesizer can receive information on the screen in the form of letters, numbers, and punctuation marks, and then "speak" aloud the information to the user.

When choosing a synthesizer, consider these features:

- The synthesizer works together with the screen-reading software that the library has selected.
- The synthesizer has adjustable volume.
- The synthesizer has an external jack for speakers or headphones.
- The synthesizer has many settings for speaking voice. Some synthesizers

allow users to select male or female voices, as well as adult or juvenile voices.

- The synthesizer allows the user to define special pronunciation rules and add words to the synthesizer's dictionary. This option is especially important when users are accessing documents of a scientific nature or those containing esoteric vocabulary.
- If the synthesizer is installed on a workstation that will be used by patrons not requiring screen-reading functions, the synthesizer should have the ability to be configured so as to not interfere with computer's sound card.

The cost of speech synthesizers varies and many come bundled with the software product. If purchased separately, synthesizers can range from \$125 to \$750.

Library staff should ask patrons who are speech synthesizer users which products they use and like. Synthesized speech has improved greatly over the past decade and has lost the tinny brogue it once possessed. Some of the artificial "voices" now sound like old friends to those who use them. As we recognize our friends' speech patterns, so too do users of screen readers recognize the nuances of familiar, albeit artificial, synthesizers.

Refreshable Braille displays

Many sighted people often ask the question, "With the advent of low-cost, accessible screen readers, why would anyone want to use Braille to access computers?" Judith Dixon, head of consumer relations for the National Library Service, noted author, computer accessibility expert, and Braille user says a Braille display allows the user to:

- Move quickly from one point on the screen to any other.
- Skip large blank spaces quickly.
- Watch an item on the screen change rather than having to query the screen for the latest update.
- Read at a personal, often variable rate, without having to manipulate software.
- Be keenly aware of items on the screen and their relative position to one another.
- Observe many specifics about the text such as spelling, punctuation, and format.

—Excerpted from: *Mates, Wakefield, Dixon. Adaptive Technology for the Internet, Chapter 4, "Touching the Internet with Braille." Chicago: ALA Editions, 2000.*

Refreshable Braille displays provide tactile output of information presented on the computer screen, a line at a time, via a Braille display unit. The display units have solenoid-driven pins that raise and lower to form the corresponding Braille cell and usually two extra cursor locator solenoids to indicate to the user where the cursor is in relation to what is currently being read. Braille displays provide access to the information on a computer screen by converting standard ASCII text into Braille. The refreshable Braille

Speech synthesizers are available from:

Artic Technologies:

www.artictech.com

Compaq Corp.:

www.compaq.com

Freedom Scientific:

www.freedomscientific.com

GW Micro:

www.gwmicro.com

HumanWare, Inc.:

www.humanware.com

Pulse Data:

www.pulsedata.co.nz

SynthaVoice:

www.synthavoice.com

Telesensory:

www.telesensory.com

displays are usually used in conjunction with a normal keyboard.

Refreshable Braille displays contain 20, 40, or 80 Braille cells. The display text is usually uncontracted and written in computer Braille. Computer Braille contains symbols and attributes unique to the technology such as backslashes or forward slashes. Braille readers use their fingertips to feel the pins that form the Braille cells. After a line has been read, the screen displays the next line.

Refreshable Braille displays can cost \$5,000 to \$8,000, depending on the number of cells displayed. Dixon offers the following considerations that should be made when choosing a Braille display:

Size of display. A 40-character display would be a good compromise when choosing a refreshable display.

Interface. When selecting a display unit, inquire about the interface requirements. Most have a serial connection, but some have an additional parallel interface option, and a few require a proprietary, internal card.

Software. The software that controls the Braille displays varies greatly. Librarians should seek consumer input as to the most appropriate control software for the Braille display. Although most Braille displays come with software, additional software may be needed due to the operating system of the computer, the configuration of the network, and other similar factors.

Features. Braille displays offer a variety of features, such as split screen access, which allows the user to read two different areas of the screen; online Braille translation; and cursor routing buttons. It is critical that the software chosen provide seamless access to Microsoft Windows.

Refreshable Braille displays are not commonplace devices in public settings since they are expensive and require the units to be protected from dust, dirt, and careless access by an inquisitive mainstream public. However, for the person wishing or needing to access the computer using Braille, they are invaluable. Refreshable Braille displays allow the user to access Web sites as a sighted user does. Also, for people who are deaf-blind, refreshable Braille displays are the only way to access information.

Braille translators

Braille translators convert text into Braille, which can be printed using a Braille embosser if hard copy is needed. The software is easy-to-use and the translation is immediate and, with few exceptions, accurate.

Duxbury Systems, Inc., supports two Braille translating systems, Duxbury and MegaDots. Currently, neither product supports a direct interface to the Internet, meaning information found must be saved before being translated and printed. Duxbury reports it's working on a more direct interface.

Index Printers, available in the United States from Sighted Electronics, supports a direct interface program, WinBraille, that allows users the luxury of Braille data directly from any Windows environment. WinBraille is a free program included with the purchase of an index embosser. Libraries may consider this option if Internet access with hard copy output is demanded and they have not selected an embosser.

Braille embosser

Braille embossers give the user hard copy of information retrieved or processed by the computer. Modern embossers are moderately priced,

Refreshable Braille vendors include:

Alva Access Group:
www.aagi.com/aagi/aagi_home.html

HumanWare, Inc.:
www.humanware.com

Duxbury Systems:
www.duxburysystems.com

Index printers and WinBraille supported by Sighted Electronics:
www.sighted.com

relatively quiet, and generally trouble-free. Should the library not be able to purchase and maintain a refreshable Braille display, embossers, when used in conjunction with screen readers, offer the user a reasonable alternative to accessing the Internet.

Embossers range in price from \$2,000 to \$4,000—the differences include speed, noise level, and the ability to print on both sides of the page. If the library anticipates a significant use of Braille embossing, note that since Braille paper is a specialized product it is relatively expensive compared with standard printer paper (about \$0.04 a sheet). Money spent on a faster, quieter, two-sided embosser can save overall costs in the long run.

Consider these features of Braille embossers:

- **Speed of embossing.** If users are students or professionals with full agendas, a faster embosser produces the material they need in less time.
- **Crispness of Braille cell output.** Have users test the Braille output to ensure the cells are definite and well-formed, rather than fuzzy and subject to interpretation.
- **Noise level.** Some units are noisy and a sound hood may have to be acquired to baffle the noise. The embosser may also need to be placed in a part of the library where the noise can be tolerated.
- **Ability to emboss on both sides of the page** (this is called interpoint Braille).
- **Ability to allow the user to do Braille embossing and ink printing on the same page.**
- **Whether the embosser's keys are labeled in Braille or the embosser has voice output directions.**
- **Type of interface required and, if the workstation supports a standard text printer, the ability to toggle between both.**

Learning to operate a Braille embosser is relatively easy. Embossers are low-maintenance devices and rarely require servicing. The Braille output from embossers is impressive to the sighted, and vital to those who read Braille.

Access for people with diminished vision or learning disabilities

Large print access to computers and information

For people with low vision, some types of learning disabilities, or people learning computer skills at a later age, large print is the preferred method to access information. Large print enables users to exploit their ability to see words by giving the user the tools to enlarge the display and alter the colors of the display or the background to make screen information more legible.

People with low vision can more easily access text that is at least 14 point and without embellishments. People with low vision may not be able to distinguish color and may need to adjust the display, but they are likely able to perform tasks requiring eye-hand coordination, such as manipulating a mouse.

Manufacturers and vendors of Braille embossers:

American Thermoform Corp.: www.atcbrleqp.com

Enabling Technologies: www.brailier.com

Freedom Scientific: www.freedomscientific.com

HumanWare, Inc.: www.humanware.com

Index Printers (Sighted Electronics, North American distributors): www.sighted.com

SynthaVoice Computers, Inc.: www.synthavoice.com

Telesensory: www.telesensory.com

People with low vision may access computer information using a large print display or speech output.

Monitors

To fully realize the large print attributes of any software program, a 19-in. or larger display monitor is recommended. Large print software programs magnify text and any other information displayed on the monitor, so a small display screen will limit the amount of information that may be assimilated at any one reading. Larger monitors may be purchased from any large appliance or computer retailer.

Keyboards

Some people with low vision never learned touch-typing and need to peek at the keys to correctly enter the right letters. Since standard keyboards have relatively small key labels, libraries need to enhance the keyboards installed at accessible workstations.

Although libraries can buy large print keyboards available, a less costly alternative is to use self-stick key tops that can be affixed to the keys quickly by staff with steady hands. The key tops are available in black displays on light backgrounds, and white displays on black backgrounds. These displays give confidence to those who need to look to find the Alt, Ctrl, Enter, and backslash (/) keys, especially those who learned the keyboard before computers were a part of everyday life.

CCTVs and the Internet

Closed circuit television viewers (CCTV) have the longest history of providing users with low vision access to print information. Basically, a CCTV system uses a video camera to capture the information the user wishes to enlarge and a dedicated monitor to display the image in a size and color the user can see. CCTVs allow the user to adjust the size of the print, the background, and the contrast with simple key strokes.

High-end closed circuit television viewers, when connected to a large display monitor, enable the user to multi-task when necessary by enlarging printed matter placed on the CCTV platform to be displayed on the monitor while also showing enlarged portions of a computer screen. This option is helpful when it is necessary to look up specific citations or assignments on the Internet and compare that with hard copy information.

Software

Several software packages allow users to manipulate what is displayed on the computer screen to a size he or she can see. The programs are about the same price; however, when selecting one, libraries should choose a program that:

- Has a great deal of flexibility since users' vision levels vary.
- Offers high contrast.
- Offers the ability to enlarge the display by a high factor by offering a fill and smooth utility for print characters that have been stretched.
- Offers the user line-by-line access.
- Offers the user mouse tracking devices.
- Offers the user the ability to split the screen into magnified and unmagnified areas. This feature allows the user to move across the page

These vendors of CCTVs link to computers for multitasking activities:

HumanWare, Inc.:

www.humanware.com

Optelec: www.optelec.com

Pulse Data:

www.pulsedata.co.nz

at his or her own speed.

- Is compatible with the video card installed in the PC and compatible with the library's browsers and other system software.
- Has voice-assist utilities for those whose access could be enhanced.

Large print output

Today's low-cost laser or ink jet printers enable users to produce large print hard copy easily and efficiently. The user needs to be mindful of the kind of print chosen for output. Choose fonts that are sans serif, clear, clean, and with white space between letters and lines. Resident fonts available that produce easy-to-read text include: Arial, Tahoma, Verdana, and Lucida Sans. Libraries should work with each patron to determine which font is easiest to see.

As the world population ages, need for large print access to information becomes greater. This is also true for those with learning disabilities who have an easier time assimilating information that has more white space around the text. With the growing number of people needing to access the computer during work, large print displays help tired eyes and tired thought processing.

Scanners help people with various disabilities

Although PC-based OCR scanner technology is primarily used for scanning documents, the technology is a valuable addition to the library environment. There may be instances when people with visual impairments, learning differences, or blindness may benefit from accessing materials found on library shelves, personal communications, or other documents that cannot be found online. A document is placed on a flatbed scanner, the scanner is given the command to scan, and the speech synthesizer reads the document aloud.

Self-Voicing OCR technology is not a new concept. The technology, however, has become more efficient, easier to use, and more affordable. There are basically two brands of scanners/readers; they are more alike than different. These are Arkenstone's Open Book Ruby Edition (now owned by Freedom Scientific) and L & H Kurzweil K1000 (owned by Lernout and Hauspie).

Dave Andrews, a columnist for *The Braille Monitor*, performed a feature-by-feature comparison of the two devices and determined that the differences between the two products are limited to philosophy, approach, and implementation. He said if one of the major players comes up with a feature the users like, the competitor's next release has that feature, too.

Both products have self-voicing applications, which means they do not have to be installed on a PC with a screen reader or speech synthesizer. If the library decides to install this device on the PC with screen reader technology, be sure to read the installation instructions carefully, as the speech applications may attempt to override each other, requiring the user to have to re-boot the program.

Both programs have their own proprietary file format and allow the importing of 150 other file formats, which can be translated into speech. The K1000 imports Grade II Braille files, which it reads aloud as it imports them.

The L & H Kurzweil Education Group has recently developed a product

Large print software vendors and manufacturers include:

AI Squared, manufacturer of ZoomText:
www.aisquared.com

Freedom Scientific, manufacturer of Magic for Windows: www/freedomsscientific.com

SynthaVoice, manufacturer of Panorama:
www.synthavoice.com

Visionware, manufacturer of LP-Windows distributed by Optelec:
www.optelec.com

Arkenstone Ruby Edition is available from Freedom Scientific/Low Vision Group, Arkenstone Division:
www.freedomsscientific.com.

Kurzweil 1000 is available Lernout & Hauspie Speech Products: www.lhsl.com/kurzweil1000/features.asp

called MagniReader for the low-vision user and users with certain types of learning differences. The product uses OCR technologies to scan a document and translate it into a large-print display, which can be read as it is spoken. Many of the attributes of the MagniReader are similar to those found on Closed Circuit Television Video display units.

Arkenstone's latest release has an e-mail option that helps beginning users set up and use e-mail. This feature was developed at the request of Arkenstone users wishing a step-by-step guide to e-mail usage.

Since both the Arkenstone and L & H Kurzweil products are similar, libraries should inquire which product patrons wish the library to acquire. Both systems can be set up for about \$1,000, which includes the purchase of a quality scanner.

For a thorough comparison of the Openbook and the Kurzweil 1000 see: Andrews, David. "Comparing the Openbook and the Kurzweil 1000." This may be accessed for a small user fee and found on the NFB Web site.

NFB: www.nfb.org

Additional software solutions for people with learning impairments

An additional software package within the Arkenstone suite enables people with reading challenges to read more easily and with greater comprehension. The software is called WYNN—What You Need Now. As scanned documents are read aloud, the software highlights the words and allows the user to increase the line and word spacing to compensate for word bleeding and perceptual difficulties. Arkenstone has recently released a version of WYNN that allows users to access electronic documents in the same manner.

Another program that helps students with severe learning disabilities that prevent them from e-mailing fellow students and being part of the group is Co:Writer from Don Johnston, Inc. This software program allows the user to use word prediction technology to write messages correctly and with increased speed.

Don Johnston, Inc.:
www.donjohnston.com

Products for people with physical impairments

People with physical impairments, such as the inability to control a mouse or press computer keys with precision, accuracy, regularity, and speed need to use other means to input data into the computer. The input solution depends on the person, type of disability, and the outcome goal of the interface.

People with physical disabilities or mobility impairments

Physical disabilities or mobility impairments may be caused by stroke, cerebral palsy, multiple sclerosis, loss of limbs, or an accident. Many people with physical disabilities can use computers without highly specialized adaptive technologies, although libraries may have to purchase inexpensive input devices such as trackballs.

For people with physical disabilities that prevent them from performing commands that require the simultaneous pressing of more than one key

(such as CTRL+ALT+DEL) to perform a function, software solutions are available in Microsoft's mainstream suite that allow the user to press one key at a time instead of all three keys together to reboot his or her computer.

For people with higher levels of physical limitations, voice recognition software for inputting data or on-screen keyboards may be required. On-screen keyboards are also available within many of Microsoft's mainstream suites.

Voice recognition

Voice recognition is not a new technology, but it is a technology that has become relatively inexpensive and easy-to-use. Contrary to popular belief, voice recognition is not a tool those with visual disabilities use with regularity; it is a tool for those who have a learning disability or a physical disability.

Voice recognition software allows the user to speak what is to be input into the computer, rather than use keystrokes or mouse clicks. This ability enables people lacking use of their hands to use computers, find information, learn, and become gainfully employed. The software is not perfect, though. For instance, speech recognition software may hear "the mail" when the user is dictating "e-mail."

The user must teach the software how he or she pronounces words, pauses within sentences, and ends sentences. With some practice and time, users can surf the World Wide Web by talking into a microphone. Users should be cautioned that although speech recognition technologies are vastly improved within the last few years, they still have only an 85% to 95% accuracy rate.

To learn a user's voice takes hours, so libraries considering installing the software must develop procedures and make accommodations to store each user's voice patterns. Before purchasing voice recognition software, ensure that the software is compatible with the system in use and that it won't interfere with resident software installed on the PC.

With the demand for Web access by users who are otherwise distracted, such as when driving, speech recognition technologies will improve. As people find telling their room lights to "turn on" a pleasure, no doubt the learning curve needed for the software to learn a person's voice patterns will decrease. In the meantime, users wishing to improve their recognition software skills may wish to visit Dan Newman's Web site at www.saylcan.com. Dan is an expert in speech recognition programs and depends on the software for producing his own research papers with complete independence.

Word prediction software

People with learning or physical disabilities that prevent them from generating text as quickly as they can think may use word prediction software. Such programs use grammatical and sentence structure rules to complete words when they start to be entered. The predicted text may save keystrokes for those unable to quickly manipulate the keys. People who use word prediction programs must be able to shift their attention back and forth between the keyboard and the screen and must be able to correctly discern the correct word when offered by the software.

Co:Writer is a product of Don Johnston, Inc. that helps users construct sentences using word prediction. This is useful for e-mail and other in-

Voice recognition producers and products include:

IBM's (Via Voice for Windows): www.ibm.com

Lernout & Hauspie (Dragon Naturally Speaking):
www.dragonsys.com

Next Generation (Jaw-Bone): www.ngtvoice.com

Speechworks (SpeechSite and Voicenote):
www.speechworks.com

This is a commercial Web site that offers an overview of natural language technologies.

Dan Newman's Web site:
www.saylcan.com

Don Johnson, Inc:
www.donjohnston.com/catalog/catalog.htm

www.texthelp.com

Vendors of touch screens include:

Edmark, Riverdeep Family (TouchWindow):

www.edmark.com

Elo TouchSystems, Inc. (Desktop CRT/LCD Touchmonitors):

www.elotouch.com

MicroTouch Systems:

www.microtouch.com

Mass Multimedia

Touchscreen:

www.massmultimedia.com

Touch Screen:

www.touchscreens.com

Troll Touch (Touchstar

Touchscreen Systems):

www.trolltouch.com

Mouse vendors include:

Kensington:

www.kensington.com

Logitech:

www.logitech.com

Mouse Systems: <http://mousesystems.com>

If the library is considering purchasing this mouse, visit Logitech's support site at www.logitech.com/cf/support/1033.cfm for full specifications.

stances when users must input a lot of original text.

TextHELP is software that would be helpful to patrons with some learning disabilities. The product includes screen reading, a spoken thesaurus, and word prediction. The TextHELP product cannot be used in conjunction with another screen reader.

Touch screens

For people with limited dexterity, touch screens are helpful. They can be added to standard monitors and may be used by mainstream patrons, as well as patrons with a disability. Some people who have severe arthritis would benefit from touch screens, which come as add-on kits for about \$200. Peripherals are available that can convert any computer monitor to a touch screen for use by people with disabilities. Generally, the units fit beneath any computer monitor up to 90 pounds and plug into the PC's serial port.

The mouse

Some users have difficulties with using a standard computer mouse, but others with severe physical limitations simply cannot use a mouse at all. For this group of people there are several types of mice and trackballs which can make the difference in inputting and retrieving information.

When selecting an alternative mouse, look for those that:

- Have buttons that are accessible but not easily triggered.
- Have buttons that lock in the down position for easy dragging.
- Have programmable buttons.
- Can adjust to cursor speed and sensitivity.
- Are designed for maximum comfort.
- Have trackballs that have diameters of at least 1 in., are slightly stiff, but move without force.

Most of these peripherals are low-cost and available in the mainstream computer world. The price range is \$29 to \$79. Several devices worth noting are:

Kensington Orbit Trackball. This device is sloping and oval-shaped, allowing the user to rest a hand on top of the device without triggering an action. There is a right and left button for action and a trackball to move up or down within the Web site. This device is good for those with severe arthritis.

Kensington Expert Mouse Trackball. Extra large buttons and a large ball offer users with little dexterity mouse access to the Web.

Logitech Cordless Trackman Wheel. This device is elongated and allows the user to rest a hand on the device without triggering an action. Action buttons are on top of the device, allowing the fingers to depress them at will. The trackball is mounted on the side, allowing the thumb to guide the movement.

iFeel MouseMan. This Logitech mouse was designed to be used with computer games but has gained a following by some with disabilities, including some people with vision impairments. The mouse is contoured and adds a sense of feel as it scrolls over iFeel-enabled dialog boxes, menus, navigational bars, icons, and other graphics. The mouse gives the users a variety of gentle vibrations. The mouse is connected through the

USB port and used with Internet Explorer 5.0 or higher. It may not work with MicroSoft NT versions.

TurboRing Trackball. Kensington designed a unique sculpted design that allows the user comfort. The large ball lets users use their fingertips to control, point, and click. The trackball is programmable to allow the user to eliminate many repetitious movements.

Access devices for people who are deaf or hearing impaired

Many hold a false belief that those who are deaf or hearing impaired do not encounter access difficulties when using the Internet. People with hearing disabilities cannot detect sound or may have difficulty distinguishing audio output from background noise. For the computer user, this means that the beep the printer makes when the print job finishes is not heard and a visual prompt is needed for notification.

A person who has been deaf from birth may have learned American Sign Language as a first language and English as a second language, so their expertise might not be in English as it appears on the Web. Although their problems may appear lesser than those with visual or physical impairments, they are nonetheless problems that can be resolved.

Microsoft's mainstream suites contain accessibility modifications that instruct the computer to show the user a visual prompt every time a beep is heard. Access programs are also available within the public domain for a small handling charge.

Resources for hearing access include:

SeeBeep is available within MicroSoft Accessibility suite. For other installations, a copy may be obtained from Simtel.net

Gallaudet University's Software to Go (STG)

Gallaudet University is considered one of the premier educational resources on the subject of deafness. In addition to its educational resources, it is home to "Software to Go" (STG), a clearinghouse for sharing software evaluation information among parents, educational programs, and agencies concerned with the educational needs of deaf and hard-of-hearing people. Information on the accessibility and nonaccessibility of shareware and subscription Web sites are found in the database. STG encourages all who work with people who are deaf or hearing impaired to submit reviews.

TTDs/TTYs and PCs

Before there was e-mail there were TTDs and TTYs. These devices allow people who are deaf or unable to speak to communicate with the hearing and speaking world. As long as the parties at either end of the call have the appropriate devices, real-time text messages can be sent through the telephone lines.

Now, those who are deaf may use e-mail to send messages to the hearing and vice-versa through the usual PC connections. PCs also make good interpreters should a deaf person need assistance in the library and a sign language interpreter is unavailable. Simply log on to a word-processing program, and type the standard library query, "May I help you?" and

www.simtel.net. File name seebeep.zip.

www.clerccenter2.gallaudet.edu/stg

allow the user to type his or her reference question.

Microsoft products offer access to users with a broad range of disabilities

Microsoft supports an excellent Web site that discusses access by people with disabilities to computers and the Internet. In addition to offering links to many other sites that discuss access and specialize in products for adaptive technology, the Web site offers detailed steps for users to take to make computers and Web sites more accessible without spending more money.

Several of the Microsoft Accessibility products make good sense for those without disabilities as well. For instance, if the library's computers are in areas that may have changeable natural light input (that is, too much or too little light), it's helpful to increase the size of the display and the cursor. Additionally, staff members who are left-handed may appreciate some of the attributes of keyboard reconfiguration. Staff members and patrons who have tasks that are repetitious and call for the use of the same key sequence may exploit StickyKeys. For ease of activation, all accessibility features may be saved as desktop shortcuts.

Microsoft states "The accessibility tools included with Windows 2000 are designed to provide a minimum level of functionality for users with special needs. Most people with disabilities will need utility programs with higher functionality for daily use." Following detailed and easy-to-follow instructions, Microsoft Accessibility Tools are easy to activate. Features for each user can be retained in a file and accessed only when needed.

Some features within the Microsoft suite include the ability to:

- Increase scalable user interface elements.
- Activate Show Pointer Trails, High Contrast Schemes, and Magnifier.
- Activate Narrator (Windows 2000), which announces events on the screen.
- Activate SoundSentry or ShowSounds, visual compensation software for sound notifications.
- Activate Pointer Schemes, for visibility and speed.
- Activate the On-Screen Keyboard.
- Activate the StickyKey program for people who have trouble pressing multiple keys simultaneously.
- Activate FilterKey, MouseKey, ToggleKey, and SerialKey settings to help people with disabilities move through Web sites.
- Activate the AutoComplete feature for Web addresses, routine forms, and logins.
- Activate the Synchronized Accessible Media Interchange (SAMI), which simplifies captioning for developers and educators who wish to make their Web sites more universally accessible. This product is available to the public as a free download.

Microsoft suggests that its accessibility options are only a start to accessing the richness of the World Wide Web. The company is working with the federal government, as well as several disability groups, to increase access.

Choosing a browser

Is there a browser that is best?

By definition, a Web browser is software that allows a user to access the World Wide Web. Text-to-speech browsers, along with Braille displays, screen readers, screen magnification, and learning-systems software can work with browsers to make output received from the Internet accessible for people with sensory impairments.

So which Web browser is the best choice for Internet users with sensory impairments? Some browsers possess the ability to adapt to certain sensory impairments, such as low vision or learning disabilities, by allowing users to customize the text size, color, and fonts of Web pages. Other browsers have been modified using adaptive hardware and software to offer people with sensory impairments access to the World Wide Web, and a few others have built-in accessibility features such as large print and text-to-speech.

Browser must be compatible with hardware and software

Often, one of the biggest factors influencing user choice in browsers is its compatibility with their adaptive hardware or software. Keep in mind a fine line exists between compatibility and usability. *Usability* often defines software that can be used with other programs; however, the software's capabilities may be rather limited. *Compatibility* often refers to hardware or software designed to work with other hardware, or applications. For example, consider JAWS for Windows 3.31, a screen reader from Henter-Joyce. JAWS 3.31 is compatible with versions of Internet Explorer 4 and higher, because it has been programmed with key command sets for assigned Internet Explorer operations. It is also usable, with enough manipulation, with Netscape Navigator to read some text from a Web page. Nevertheless, effectively operating Netscape 4.0 and JAWS 3.31 together is next to impossible. They are incompatible because Henter-Joyce didn't provide the same key command support for Netscape that it had for Internet Explorer. On a side note, though, Henter-Joyce has included key command support for Netscape Navigator 4.5 with its latest release of JAWS for Windows 3.7.

Netscape Navigator and Microsoft Internet Explorer

For impaired and nonimpaired users, the two most prominent types of browsers are text and Windows-based browsers. A text browser displays the textual content of a Web site, omitting pictures, Java script, applets, and other graphical displays. One of the most popular text browsers among users is Lynx, providing basic Internet service in a DOS environment. Netscape Navigator and Microsoft Internet Explorer are two popular examples of the more widely used Windows-based browsers. These free browsers are available for both Macintosh and personal computers running Windows 95 or later operating systems.

IBM Home Page Reader

Another type of browser that is particularly valuable for people who are blind or have low vision or a learning disability is a text-to-speech browser. For instance, Home Page Reader from IBM is a specially adapted text-to-speech browser for users requiring audio output for the content and navigation of a Web page and uses IBM's viaVoice text-to-speech synthesizer. If library patrons only need Web access, then IBM Home Page Reader could be considered.

For IBM Home Page Reader features, systems information, software requirements and 30-day trial version of IBM Home Page, see its Web site.

The problem with point-and-click browsing

One of the biggest difficulties faced by Internet users with sensory impairments is physical access. For the most part, Web browsers, along with Web pages and sites, are geared for point-and-click browsing. For that reason, a mouse or similar alternative pointing device remains the easiest way to supply input to navigate a Web page. Every effort should be made to give access to those with disabilities through the use of a mouse.

Mouse enhancement software is available that allows users to customize the appearance and size of the mouse cursor. For those who cannot use a standard mouse, additional means of supplying input exist, including a standard or on-screen keyboard, switches, and voice recognition or natural language technology. Accordingly, much of this technology requires a compatible browser, which is usually listed with a particular product. Other features, such as spell checkers, word-prediction, abbreviation-expansion programs, and text-to-speech engines can also enhance browsing for sensory-impaired users and are especially handy when writing e-mail or instant messaging or working in applications requiring a large amount of text input. Text-to-speech browsers can be particularly helpful for the blind or people with learning disabilities by providing audio for the user's input.

Think about technology for all by talking to all

Many tools are available that enable libraries to give all their patrons access to print and the Internet. Staff may be overwhelmed about where to begin. The easiest and the fairest way to get started is to assemble an advisory board. The board should consist of people with visual impairments, hearing impairments, and physical impairments that prevent them from using the library and its resources in the same way as those without impairments, caregivers, and patrons currently without disabilities. When meeting with the board:

1. Be honest and open. Tell them funds are limited and that, while the library wants to eventually serve everyone, it needs to identify where the need is the greatest.
2. Determine what types of hardware and software are needed; determine what resources the library may have on hand. Jane Berliss-Vincent has developed a useful checklist for small and large libraries.
3. If it is a large system, determine where the equipment should be placed.

www-3.ibm/able/hpr.html

See checklist at:
www.infopeople.org/training/past/2001/accessibility/checklist.pdf

4. Determine if there is a possibility for patron support for training new users.
5. Determine if any funding or partnering resources exist. Board members might offer usable suggestions. Having a waiting list of potential users can help sway an endowment board.
6. Develop short- and long-term goals. For instance, by December 2001 the library's Web site will be more accessible than it currently is; by July 2002 the library's Web site will be totally accessible.
7. Request that the board spread the word about the library's assistive technology plan.

Having plans and a consumer advisory board working with the library staff avoids costly mistakes and demonstrates the library's commitment to community involvement. Together, libraries and patrons can make access to information available to all.

For advice on products for:

Hearing impairment

National Association of the Deaf: www.nad.org

Self-Help for Hard of Hearing People:
www.shhh.org

Vision impairment

National Federation of the Blind: www.nfb.org

American Council of the Blind: www.acb.org

Learning disabled

International Dyslexia Association:
www.interdys.org

National Center for Learning Disabilities:
www.ld.org/resources/index.cfm

Physically disabled

National Multiple Sclerosis Society: www.nmss.org

United Cerebral Palsy Association: www.ucpa.org

